

CDIAC

CALIFORNIA  
DEBT AND  
INVESTMENT  
ADVISORY  
COMMISSION

# Investment Structures and Risk Management



**Moderator:**  
Debbie Higgins  
President  
Higgins Capital Management

March 28, 2012

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Managing Director

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PFM Asset Management LLC

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Fixed Income Specialist  
Bloomberg LP

# Risks

Callables???

Agencies???

Shorten  
Duration???

Rising Interest  
Rates???

Falling Interest  
Rates???

Lengthen  
Duration???

Inflation???

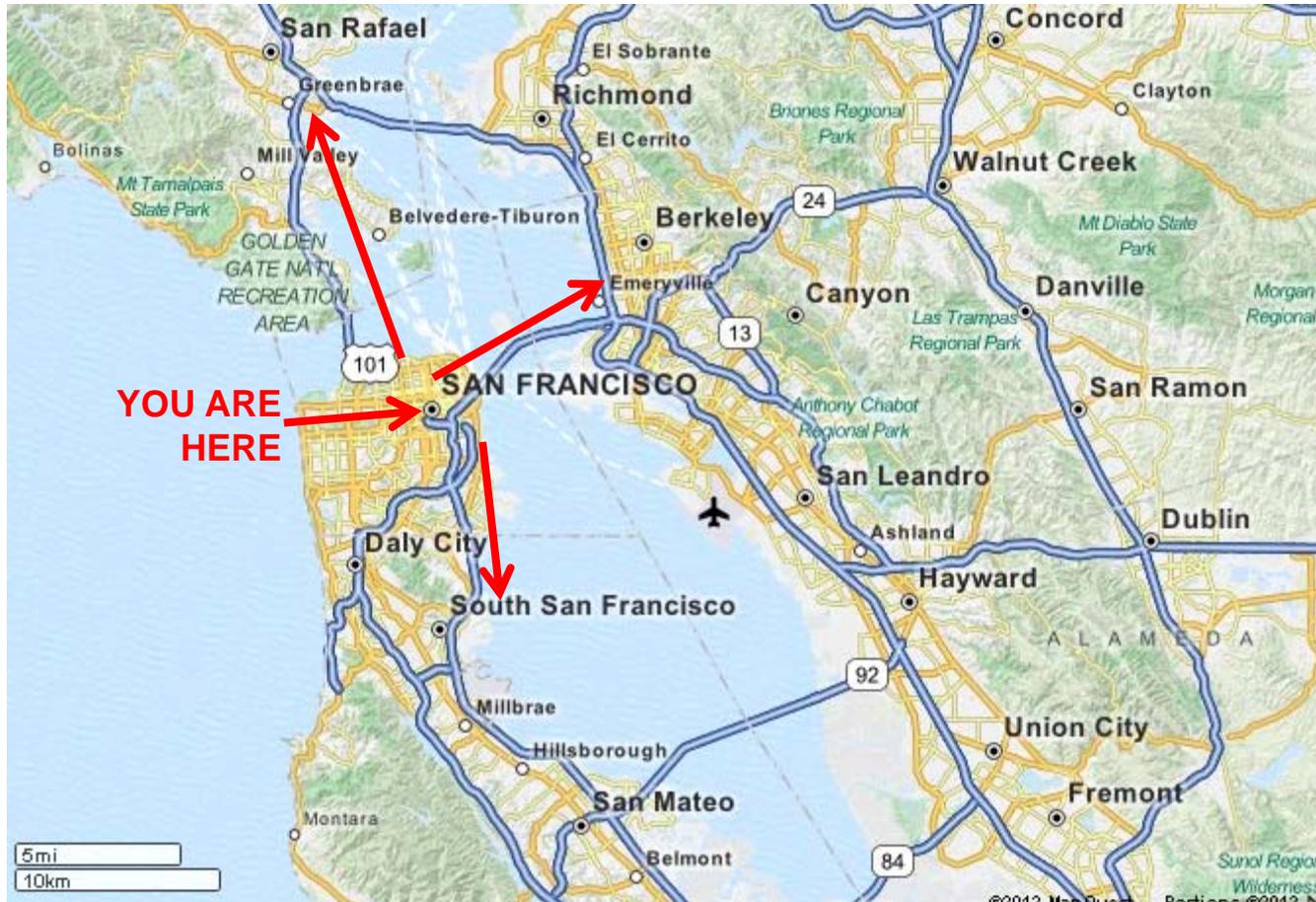


Corporates???

Mutual  
Funds???

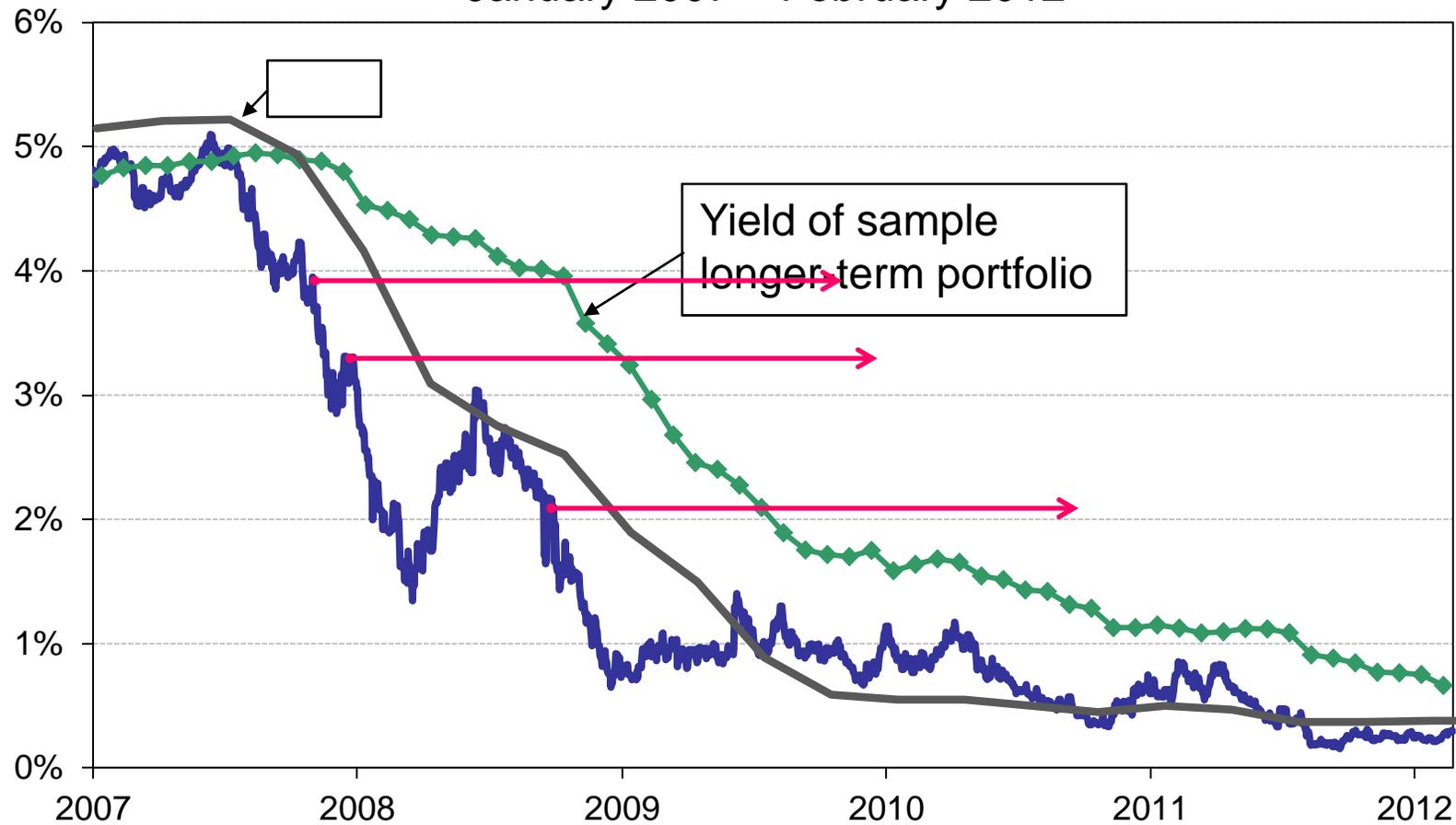
Step-  
Ups???

# Manage Risks by Knowing Where You Want to Go



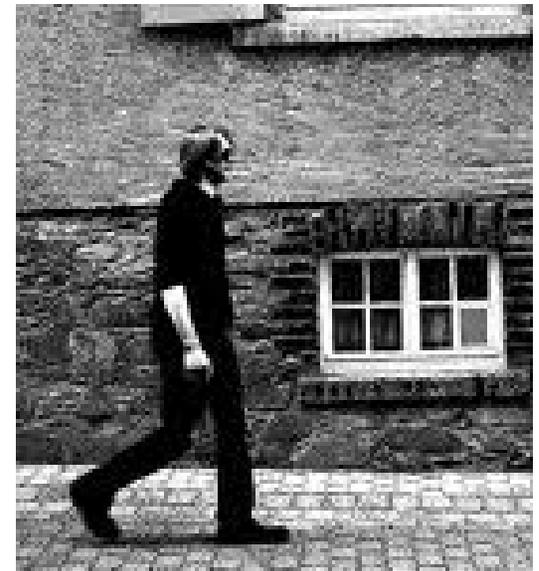
# Risk of Not Having a Long-Term Investment Strategy

## 2-Year U.S. Treasury Note Yield January 2007 – February 2012



# First Principle of Managing Risk

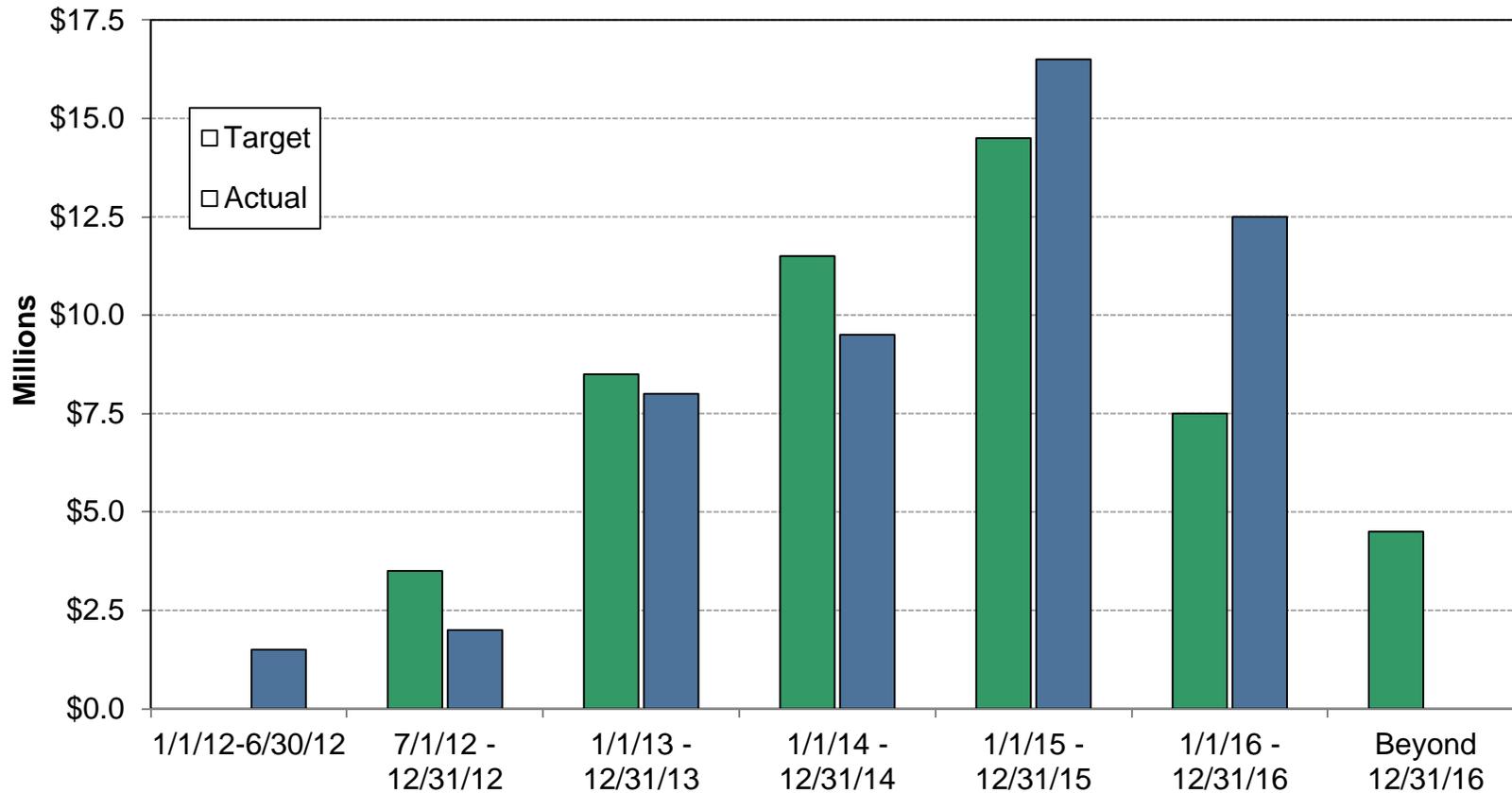
- Know what risks you are willing to take



# Manage Risk by Establishing Guidelines

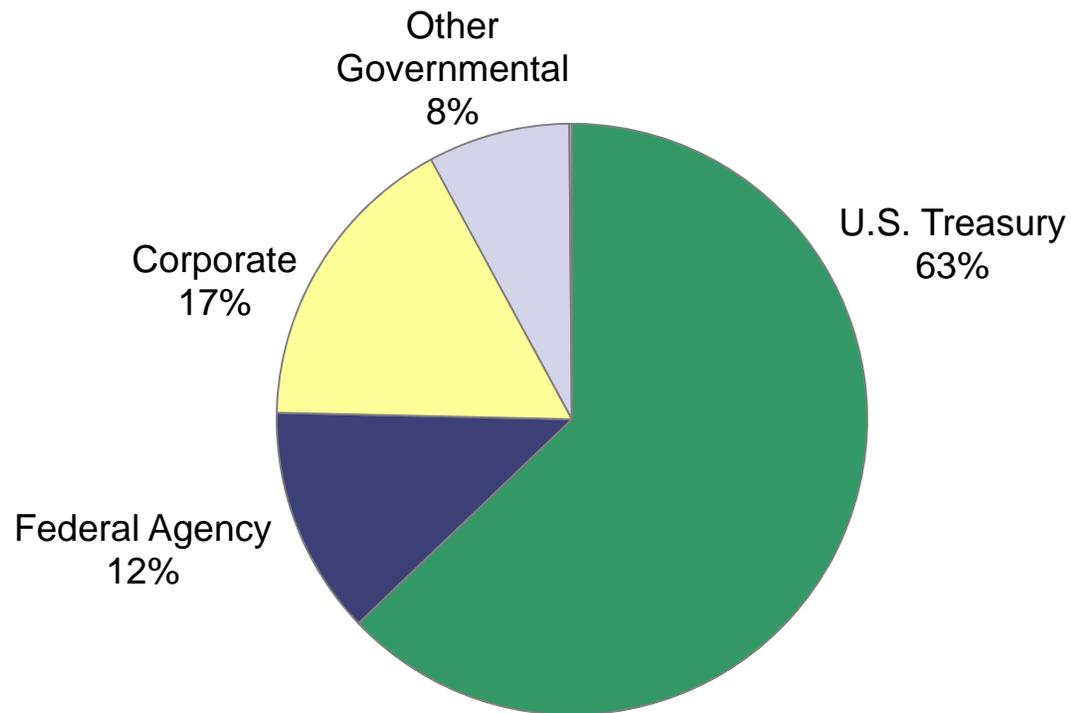
- Write them
- No more than [??%] in securities other than Treasuries and Agencies
- No more than [??%] in any one issuer
- Target average maturity? Or average duration? Or targeted maturities?
- Real performance metrics that measure level of success achieving purpose of the portfolio

# Target Maturity Buckets



# Target Benchmark Sector Composition

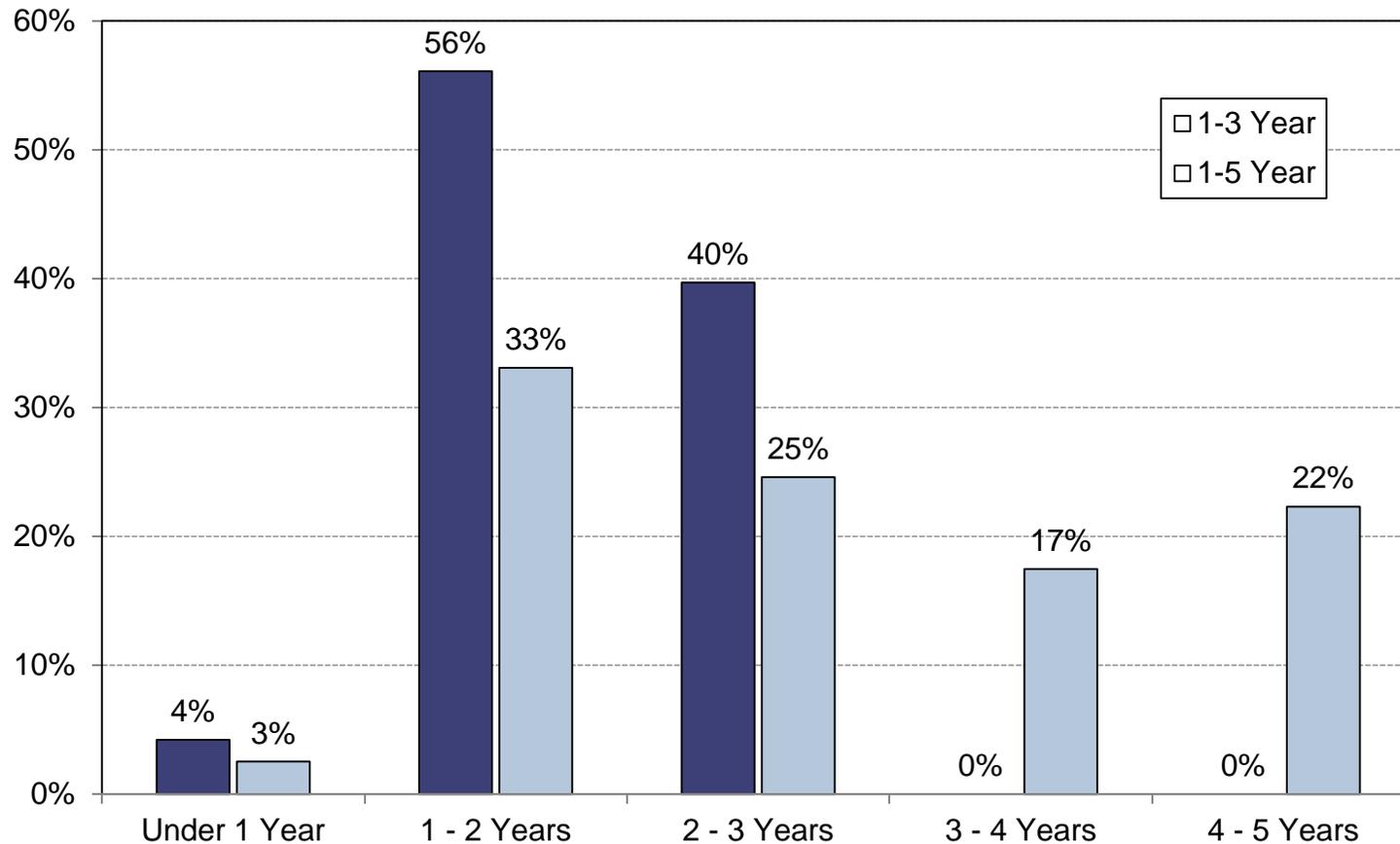
**Benchmark: 1-5 Year U.S. Government/Corporate (A or better)**



Source: Bank of America/Merrill Lynch 1-5 Year U.S. Government/Corporate (A or better) Index holdings as of December 31, 2011

# Target Benchmark Maturity Distributions

**Benchmark: 1-3 Year U.S. Treasury Index  
vs 1-5 Year U.S. Treasury Index**



Source: Bank of America/Merrill Lynch U.S. Treasury Index holdings as of December 31, 2011

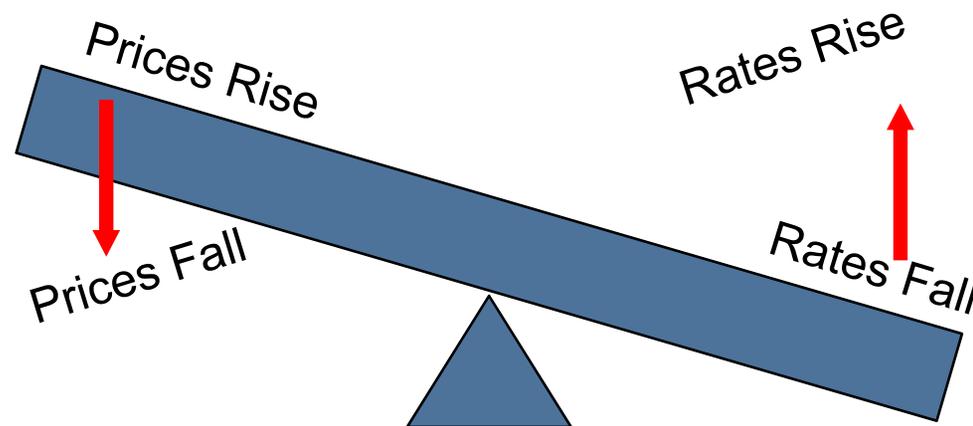
## Most Common Types of Risk

- Interest rate risk
- Call risk
- Credit risk

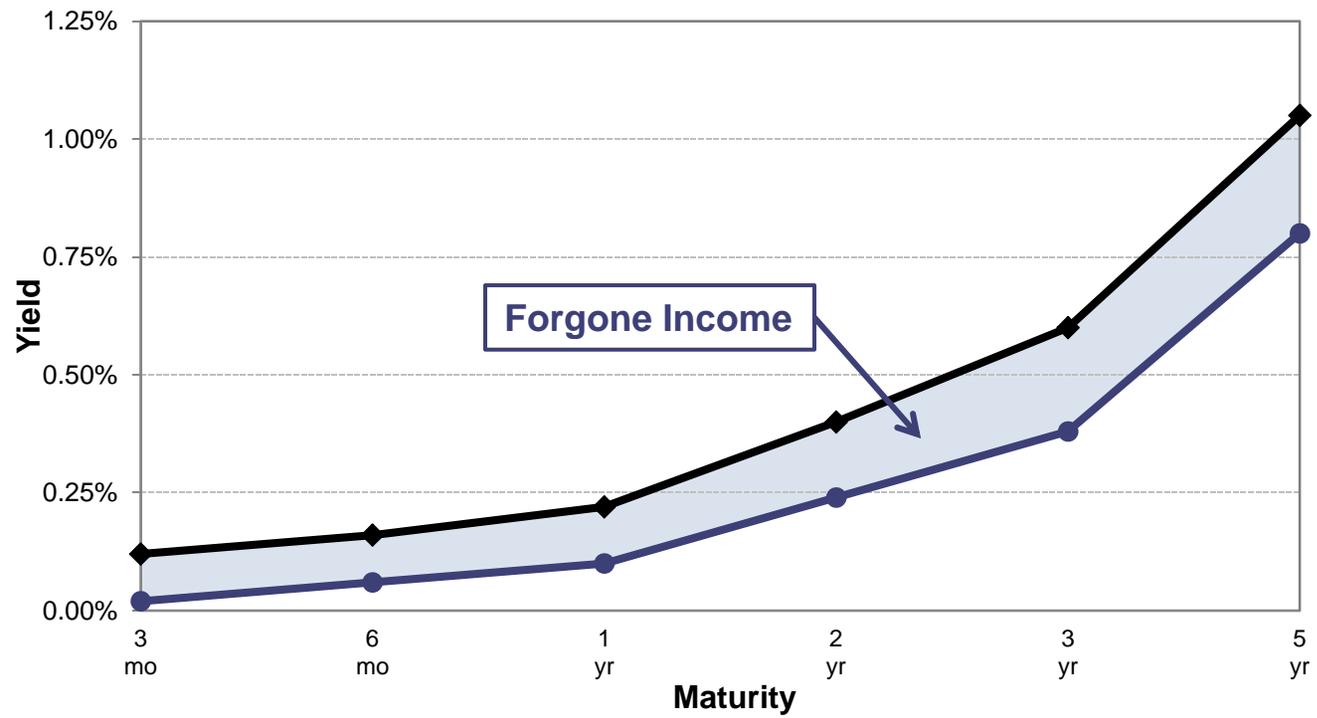
# Interest Rate Risk

# Interest Rate Risk

- The risk that an investment's value will change due to a change in:
  - Absolute level of interest rates
  - Shape of the yield curve
  - Spread between sectors
- Inverse relationship exists between the direction of interest rates and the price of a bond
- Longer maturities have more interest rate risk

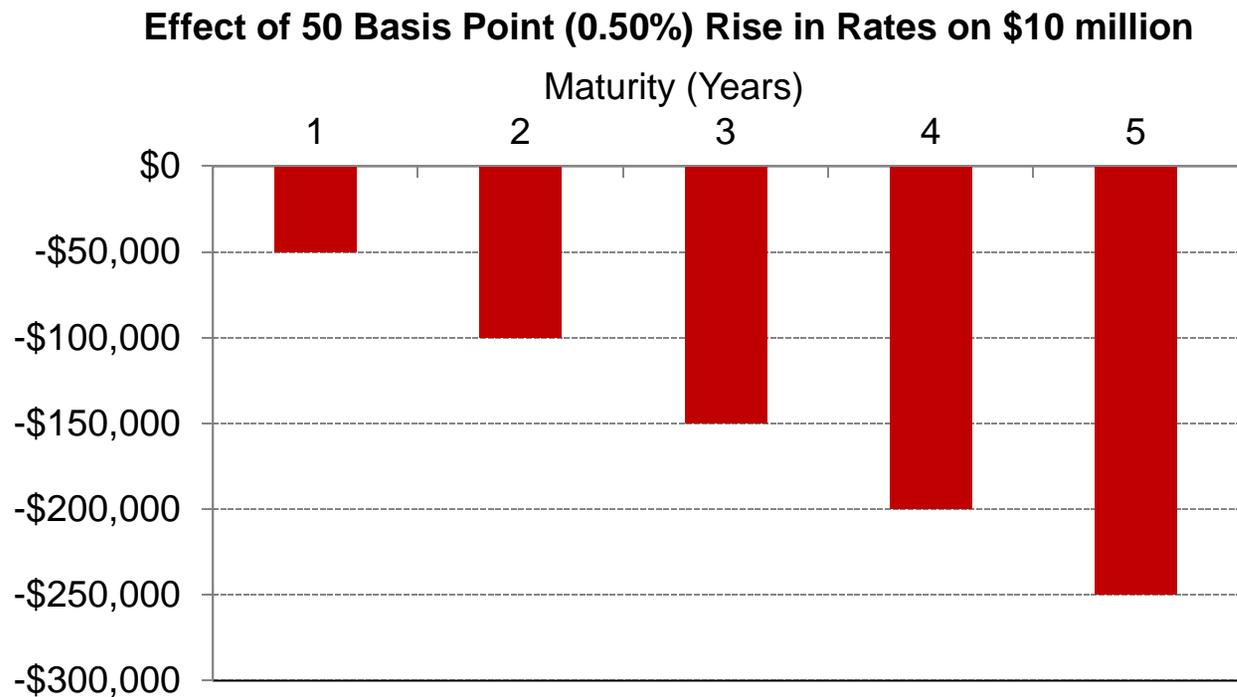


# Interest Rate Risk



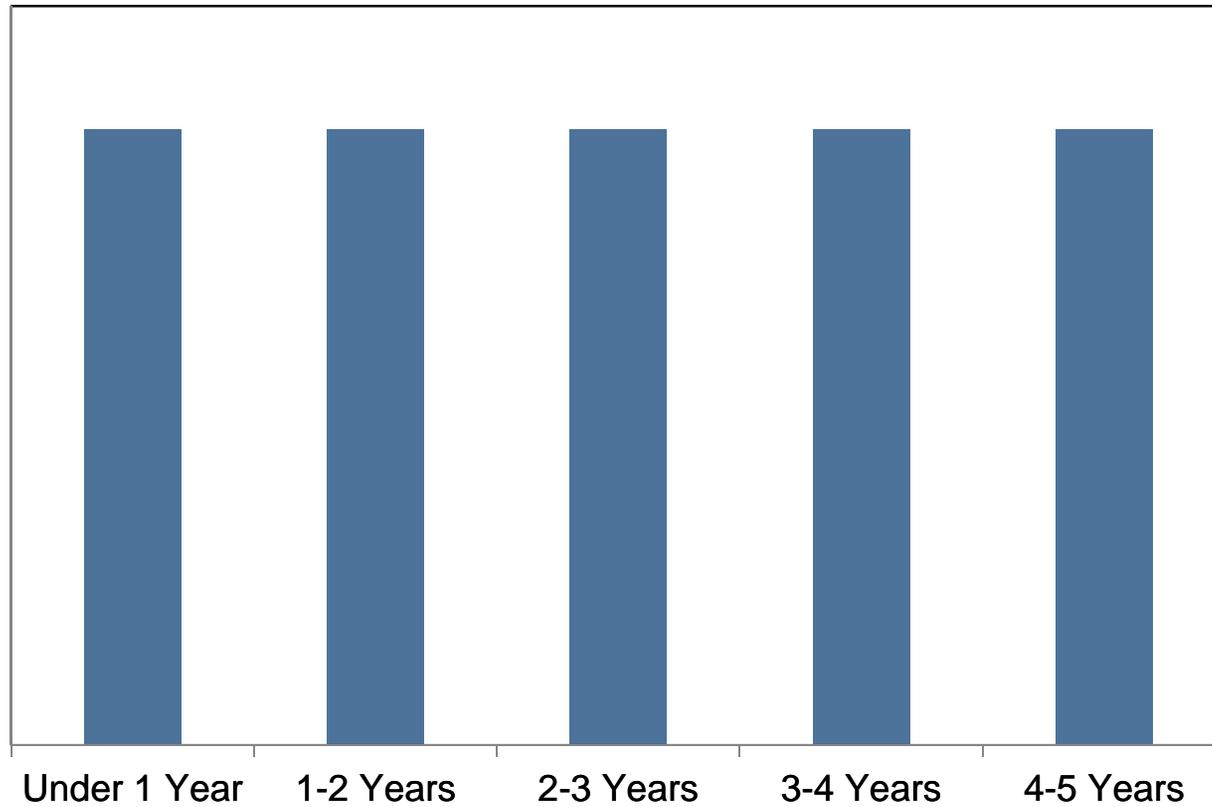
# Interest Rate Risk Can Be Managed

- Investors can quantify how much the price of a bond will change as the yield changes through duration.
- Duration is a measure of the percent change in a bond's value as yields change.

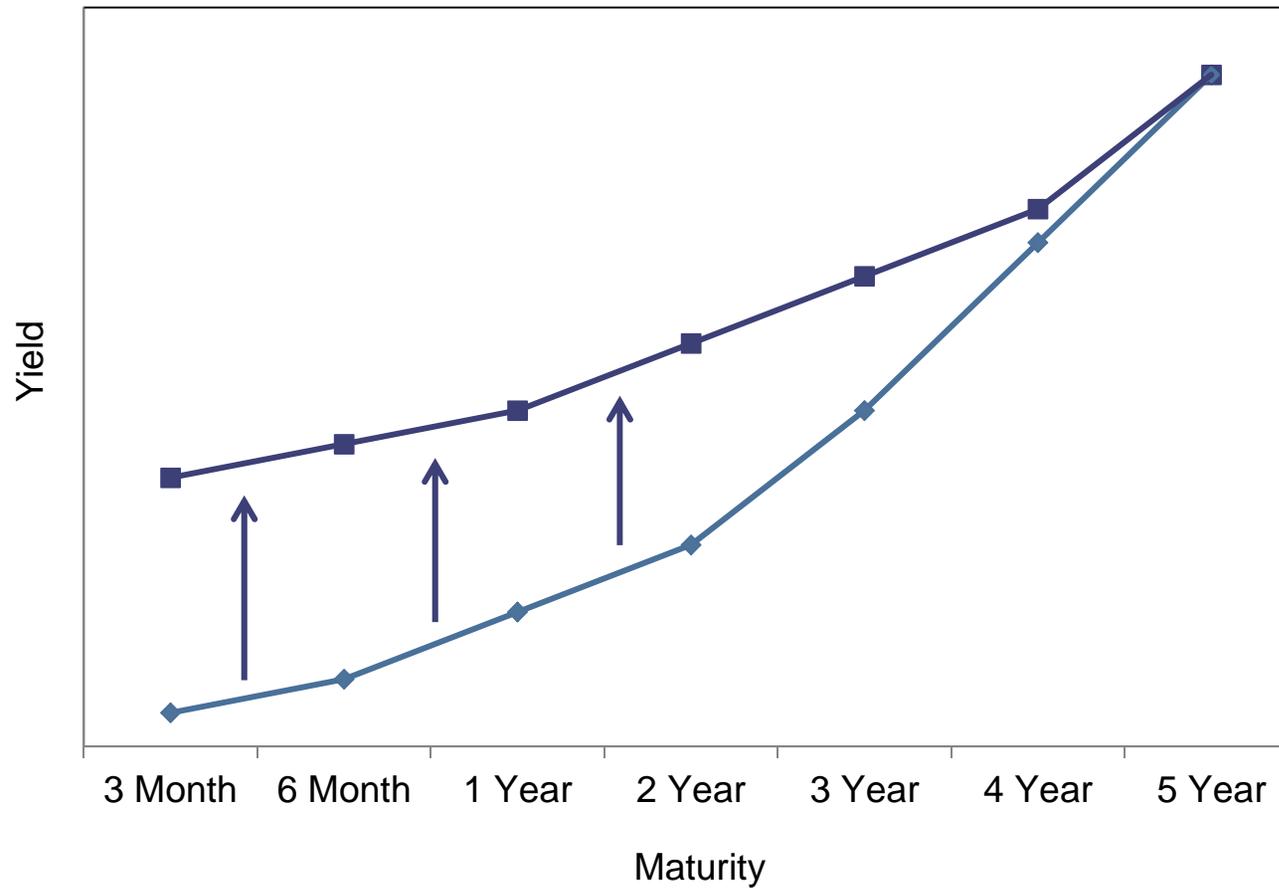


# Portfolio Structure Affects Performance

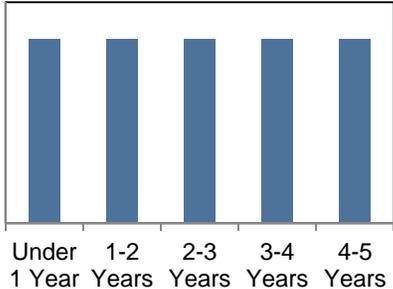
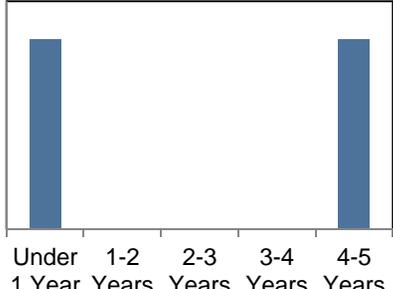
Ladder Maturity Structure



# Portfolio Structure Affects Performance



# Portfolio Structure Affects Performance

| Portfolio Structure                                                                                                                                                   | Yield Curve Effect (%) | Yield Curve Effect (\$ on \$50 million) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|
| <p>Ladder</p>  <p>Under 1 Year   1-2 Years   2-3 Years   3-4 Years   4-5 Years</p>   | -0.70%                 | -\$350,000                              |
| <p>Barbell</p>  <p>Under 1 Year   1-2 Years   2-3 Years   3-4 Years   4-5 Years</p> | -0.33%                 | -\$165,000                              |

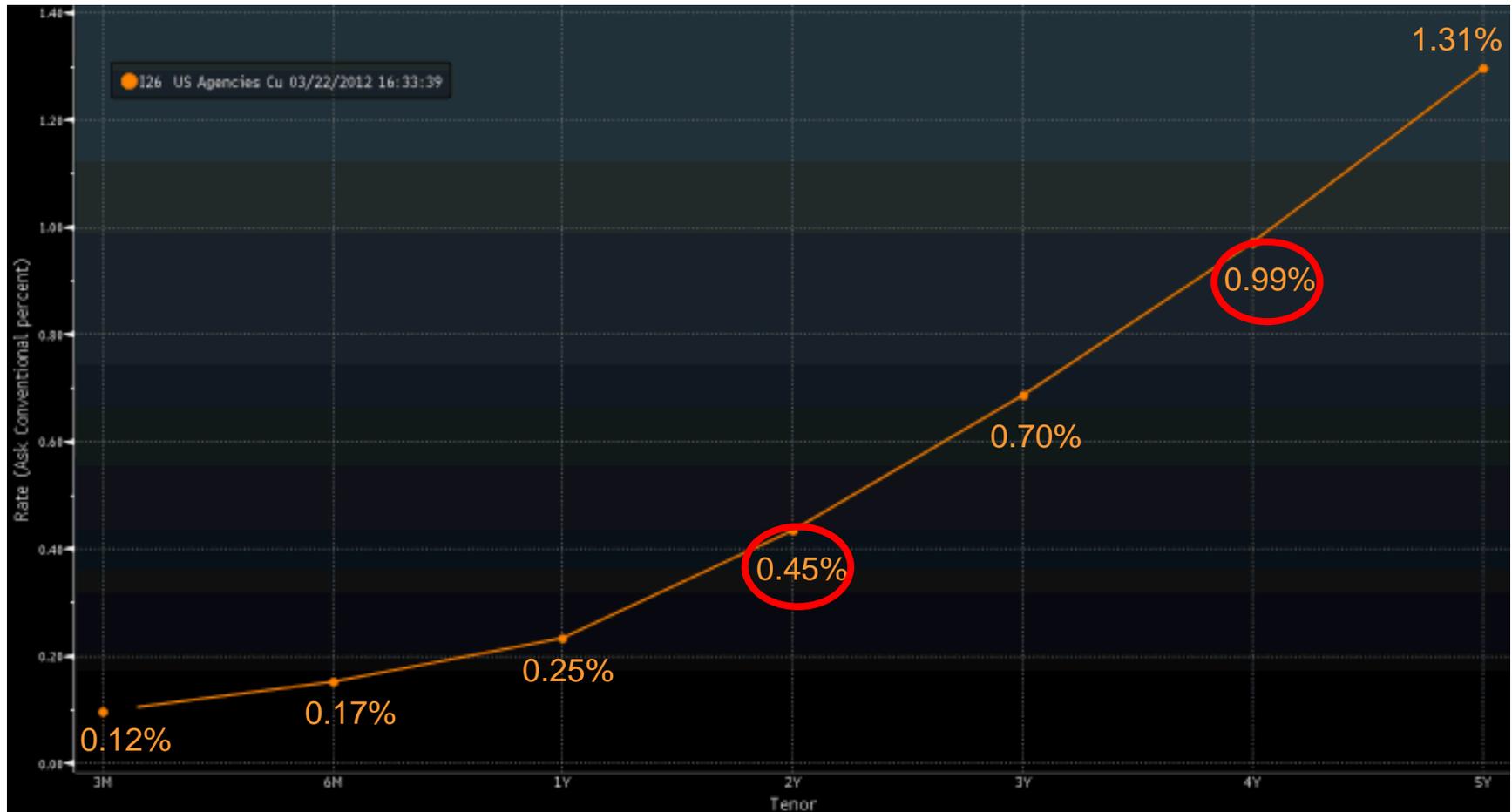
# Portfolio Structure Affects Performance

| Portfolio                               | AGENCY BARBELL STRATEGY |              |               |            | Currency  | USD  |      |         |
|-----------------------------------------|-------------------------|--------------|---------------|------------|-----------|------|------|---------|
| Scenario Set                            | CDIAC EXAMPLE           | Time Horizon | 0 Days        | As of      | 3/26/2012 |      |      |         |
| <b>Scenario Results (CDIAC EXAMPLE)</b> |                         |              |               |            |           |      |      |         |
| Scenario Name                           | Principal (M)           | AI (M)       | Cash Flow (M) | Hz Val (M) | Dur       | Conv | YTW  | Ret (%) |
| 9) Current Portfolio                    | 109,709.59              | 31.76        | -             | 109,741.35 | 2.03      | 0.10 | 0.54 | -       |
| 10) Bear Flattener                      | 109,350.87              | 31.76        | 0.00          | 109,382.62 | 2.02      | 0.10 | 0.73 | -0.33   |

| Portfolio                               | AGENCY BULLET LADDERED |              |               |            | Currency  | USD  |      |         |
|-----------------------------------------|------------------------|--------------|---------------|------------|-----------|------|------|---------|
| Scenario Set                            | CDIAC EXAMPLE          | Time Horizon | 0 Days        | As of      | 3/26/2012 |      |      |         |
| <b>Scenario Results (CDIAC EXAMPLE)</b> |                        |              |               |            |           |      |      |         |
| Scenario Name                           | Principal (M)          | AI (M)       | Cash Flow (M) | Hz Val (M) | Dur       | Conv | YTW  | Ret (%) |
| 9) Current Portfolio                    | 110,822.20             | 204.43       | -             | 111,026.63 | 2.16      | 0.09 | 0.55 | -       |
| 10) Bear Flattener                      | 110,045.18             | 204.43       | 0.00          | 110,249.61 | 2.14      | 0.09 | 0.99 | -0.70   |

# Opportunities in Steep Yield Curve

## Federal Agency Yield Curve March 22, 2012



# Breakeven Analysis

## Buy 4-Year Agency at 0.99%

| Annual Interest on<br>\$10 million |                  |
|------------------------------------|------------------|
| Year 1                             | \$99,000         |
| Year 2                             | \$99,000         |
| Year 3                             | \$99,000         |
| Year 4                             | \$99,000         |
| <b>Total</b>                       | <b>\$396,000</b> |

## Buy 2-Year Agency at 0.45%

| Annual Interest on<br>\$10 million |          |
|------------------------------------|----------|
| Year 1                             | \$45,000 |
| Year 2                             | \$45,000 |
| Year 3                             | ?        |
| Year 4                             | ?        |
| <b>Total</b>                       | <b>?</b> |

Rates rise  
1.00%. Buy new  
2-Year Agency  
at 1.45%.

# Consider the FOMC's Outlook for Interest Rates

**NOEM**

**Targeted Federal Funds Rate at Year-End**  
FOMC Member Forecasts as of January 25, 2012



Source: Federal Reserve Open Market Committee

# Call Risk

# Call Risk

- The risk that an investment will be called prior to maturity.
- Call risk premium: Callables tend to have higher yields than non-callables to compensate for the risk that the bond will, or will not, be redeemed.
- Issuer will always exercise call option to investor's disadvantage.

| Movement of Interest Rates | Call Option Exercised? | Outcome |
|----------------------------|------------------------|---------|
| Rise Higher                |                        |         |
| Fall Lower                 |                        |         |

# Types of Call Options

## Non-callable

*Purchase*

*Final Maturity*

### American: Callable Anytime

Lock-out period

Call period

### Bermudian: Specified Dates

Lock-out period

Call Date

Call Date

Call Date

### European: One-time Call Date

Lock-out period

Call Date

### Step-Up: Specified Dates or Coupon "Steps Up"

Lock-out period

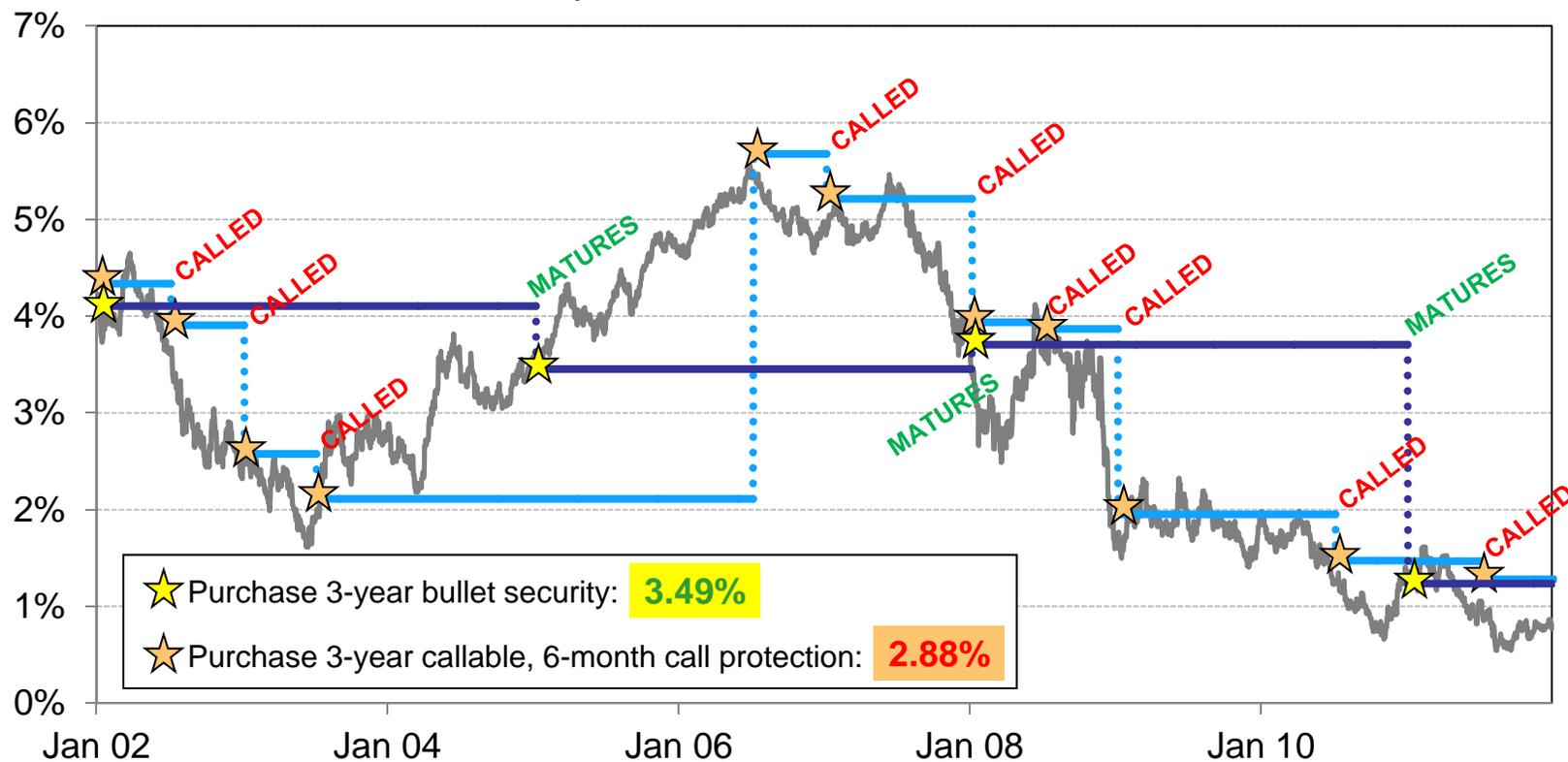
Call/Step-Up

Call/Step-Up

Call/Step-Up

# Bullets versus Callables

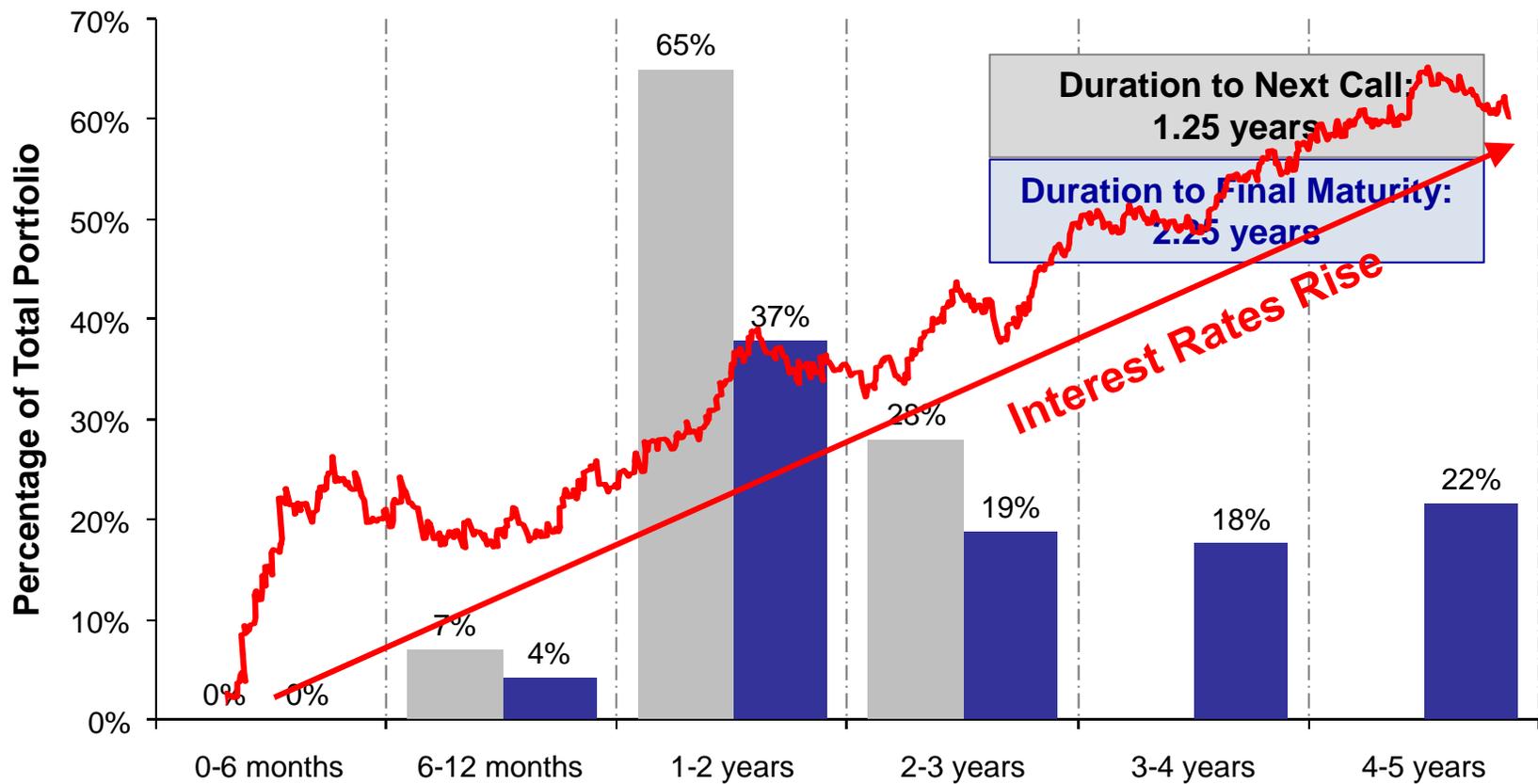
**3-Year Federal Agency**  
January 1, 2002 – December 31, 2011



Source: Bloomberg

# Callables Add Complexity to Duration Management

## Portfolio Maturity Distribution



# Rising Rates Extends Duration on Callable Bonds

|                                |            |         |                     |              |       |
|--------------------------------|------------|---------|---------------------|--------------|-------|
| FNMA 1.5 4/17/17 ( 3136G0AA9 ) |            |         |                     | Risk         |       |
| Spread                         | 38.70 bp   | vs      | 5y T 0 7/8 02/28/17 | Maturity     | OAS   |
| Price                          | 100-00     | 3 dec   | ↻ 98-27+ 10:38:     | Mod Duration | 4.800 |
| Yield                          | 1.5000000  | Wst     | 1.1130329 S/A       | Risk         | 4.800 |
| Wkout                          | 04/17/2017 | @100.00 | Consensus           | Convexity    | 0.259 |
|                                |            |         |                     |              | 1.810 |
|                                |            |         |                     |              | 1.810 |
|                                |            |         |                     |              | 1.987 |

Rates  
Rise  
0.50%

Duration  
Extends  
2.13

|                                |            |         |                     |              |        |
|--------------------------------|------------|---------|---------------------|--------------|--------|
| FNMA 1.5 4/17/17 ( 3136G0AA9 ) |            |         |                     | Risk         |        |
| Spread                         | 88.70 bp   | vs      | 5y T 0 7/8 02/28/17 | Maturity     | OAS    |
| Price                          | 97.632     | 3 dec   | ↻ 98-27+ 10:38:     | Mod Duration | 4.785  |
| Yield                          | 2.0000000  | Wst     | 1.1130329 S/A       | Risk         | 4.672  |
| Wkout                          | 04/17/2017 | @100.00 | Consensus           | Convexity    | 0.258  |
|                                |            |         |                     |              | 3.944  |
|                                |            |         |                     |              | 3.851  |
|                                |            |         |                     |              | -2.170 |

# Call Risk Can Be Managed

- Limit percentage of callable securities held in portfolio
- Utilize different call structures
- Diversify callable issuers
- Evaluate relative value using option adjustment spread analysis (OAS)
  - OAS assumptions can change the results dramatically

# Agency Option-Adjusted Spread Analysis

FANNIE MAE FNMA 1 1/2 04/17 99.858/99.928 (1.53/1.52) BVAL

Calculate **Price** **OAS (bp)** **Volatility**  
 (P,0,V)  P) **99-16** **0) - 4.99** **V) 51.29**

Bermudean call  
 Cusip / ID# 3136G0AA9 Option Px Value: 1.48  
 Settle **4/17/2012** Bench settle **3/23/2012** Vega: 0.03  
 Spread **124.1bp vs2Y** T 0 1/4 02/28/14 Govt@**99-25** ( 0.363)

2) Customize  
 Curve **I252** Semi  
**BMA-FNMA** Benchmar  
 Dated **3/22/2012**  
 Settle **4/17/2012**  
 A BMA CMT  
 Shift **+0(bps)**  
 \*Yield Adjust

|       | OAS Method | Option Free | To Call on 10/17/2012 | To Mty |
|-------|------------|-------------|-----------------------|--------|
| Yld   |            | 1.297       | 2.513                 | 1.604  |
| Sprd  |            | -5.3        | 235.5                 | 25.5   |
| M Dur | 2.28       |             | 0.49                  | 4.80   |
| Risk  | 2.27       |             | 0.49                  | 4.77   |
| Cnvx  | -2.12      |             | 0.00                  | 0.26   |

{NUM}<Go> for:  
 3) Call Schedule

|            |        |
|------------|--------|
| 10/17/12   | 100.00 |
| 1/17/13    | 100.00 |
| 4/17/13    | 100.00 |
| 7/17/13    | 100.00 |
| 10/17/13   | 100.00 |
| 1/17/14    | 100.00 |
| 4/17/14    | 100.00 |
| 7/17/14    | 100.00 |
| 10/17/14   | 100.00 |
| 1/17/15    | 100.00 |
| ...more... |        |

Model  L=Lognormal  
 Exercise Premium **0.00**  
 \*Curve Source **BBAG** Bloomberg Agency Composite

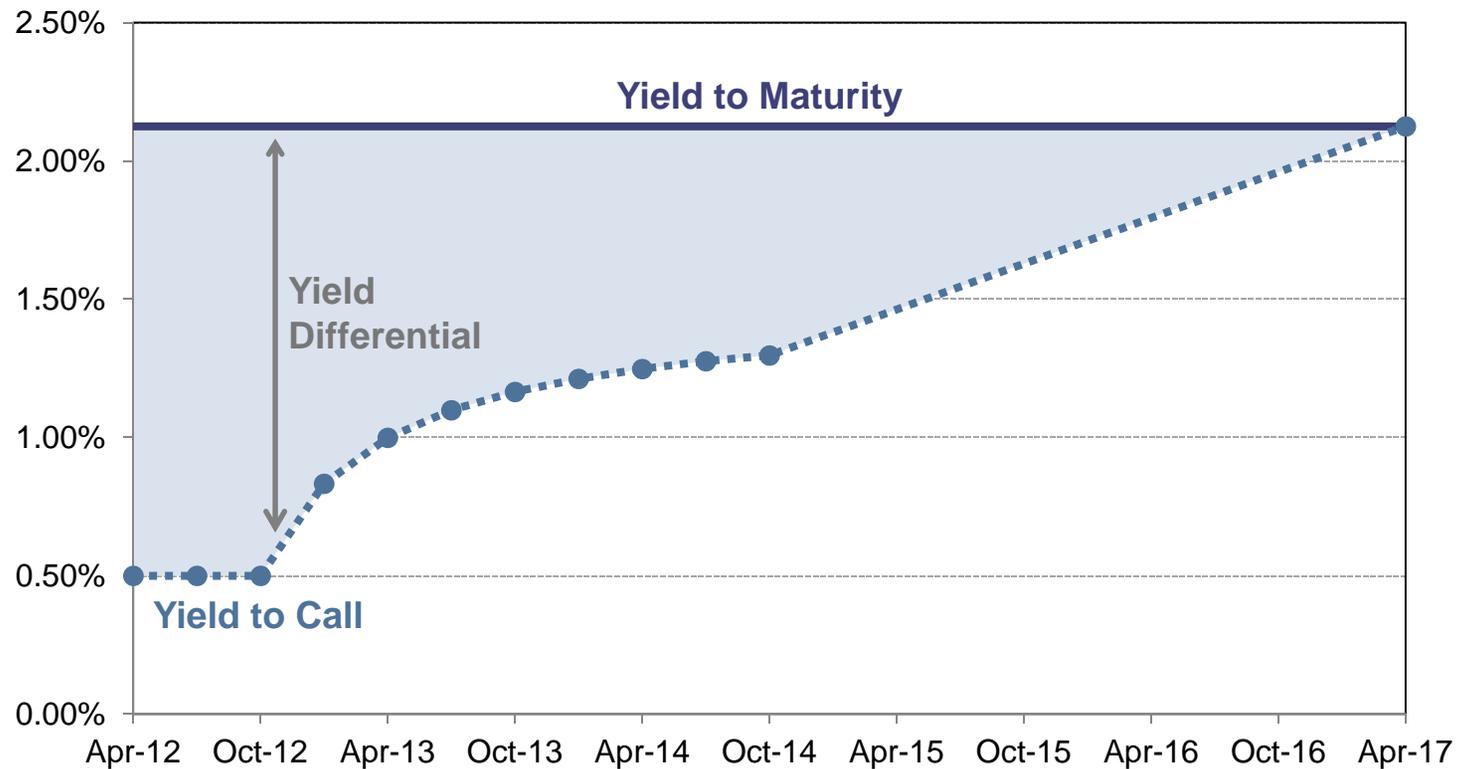
|     |       |       |
|-----|-------|-------|
| 3m  | 0.102 | 0.1   |
| 6m  | 0.156 | 0.1   |
| 1y  | 0.255 | 2.5   |
| 2y  | 0.447 | 1.2   |
| 3y  | 0.680 | 0.7   |
| 4y  | 0.997 | 0.5   |
| 5y  | 1.272 | 7.7   |
| 7y  | 1.298 | 33.3  |
| 10y | 1.391 | 71.9  |
| 20y | 2.464 | 129.1 |
| 30y | 3.538 | 186.2 |

**88) REFRESH**

# Step-Up Callable: Yield to Call vs. Yield to Maturity

## Step-Up Security

- Issuer: FHLB
- Maturity: April 2017
- Yield to Maturity: 2.13%
- Initial Coupon: 0.50%



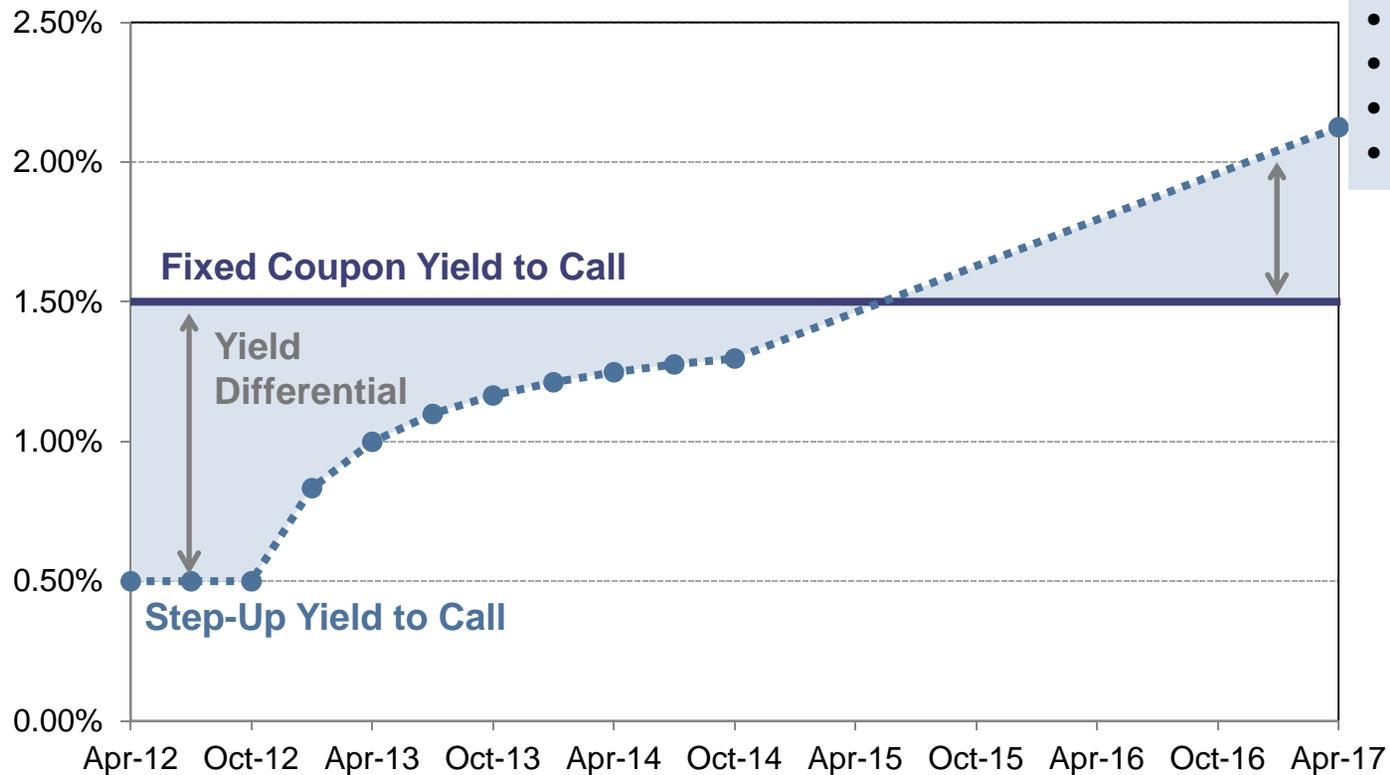
# Step-Up Callable vs. Fixed Coupon Callable

## Step-Up Callable

- Issuer: FHLB
- Maturity: April 2017
- Yield to Maturity: 2.13%
- Initial Coupon: 0.50%

## Fixed Coupon Callable

- Issuer: FNMA
- Maturity: April 2017
- Yield to Maturity: 1.50%
- Initial Coupon: 1.50%



# Credit Risk

# The Many Faces of Credit Risk

- **Default Risk:**

- Risk that an issuer of a note or bond will be unable to meet its financial obligations.

- **Market Value Risks:**

- Downgrade: the risk that a bond's price will decline due to a downgrade in its credit rating.
- Credit spread: risk of market value loss resulting from changes in the level of credit spreads.

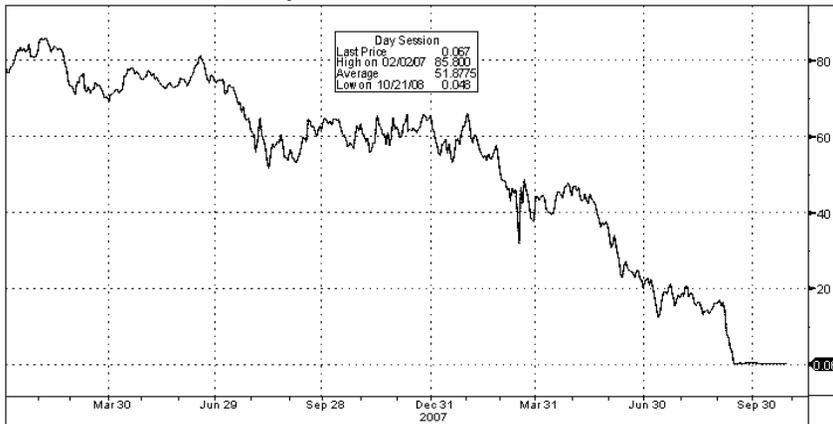
**Bond yields correlate strongly to their perceived credit risk.**



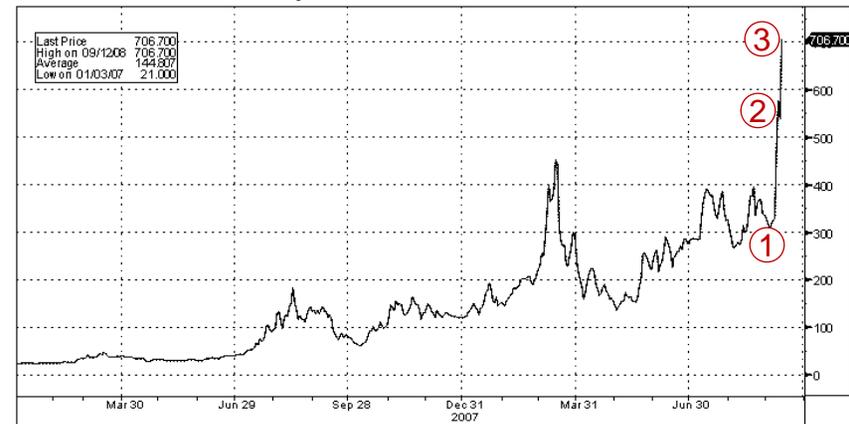
# Manage Default Risk by Monitoring Other Markets

## The Warning Signs for Lehman Brothers

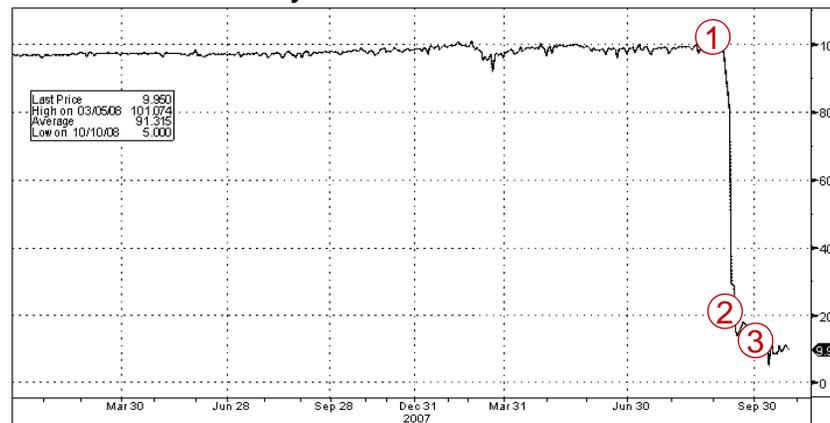
**Stock Price**  
January 2007 – October 2008



**Credit Default Spread**  
January 2007 – October 2008



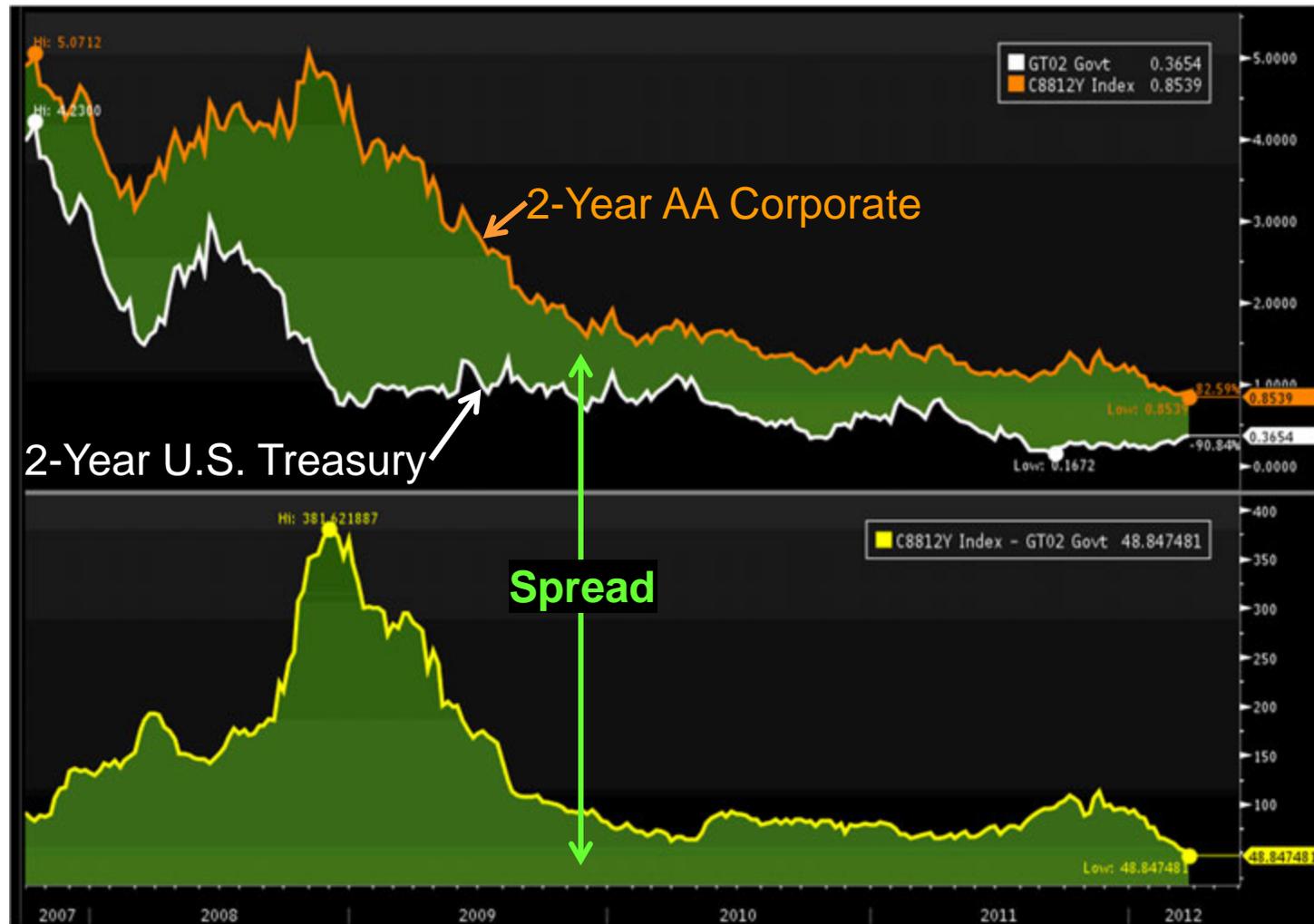
**Bond Price**  
January 2007 – October 2008



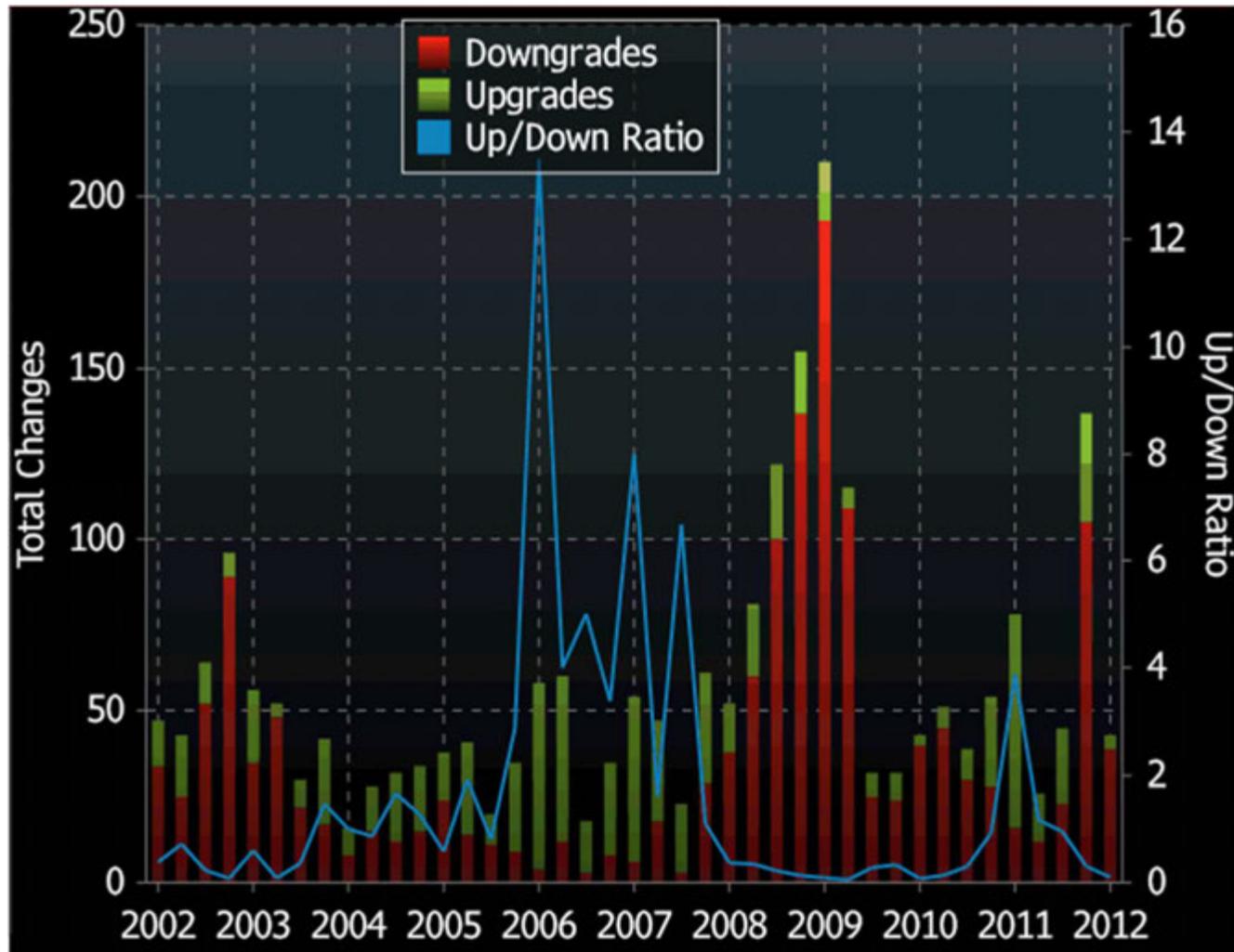
1. Sep. 9 – Put on negative credit watch by S&P
2. Sep. 15 – Downgraded from A to CCC- by S&P
3. Sep. 16 – **Declared bankruptcy**

Source: Bloomberg

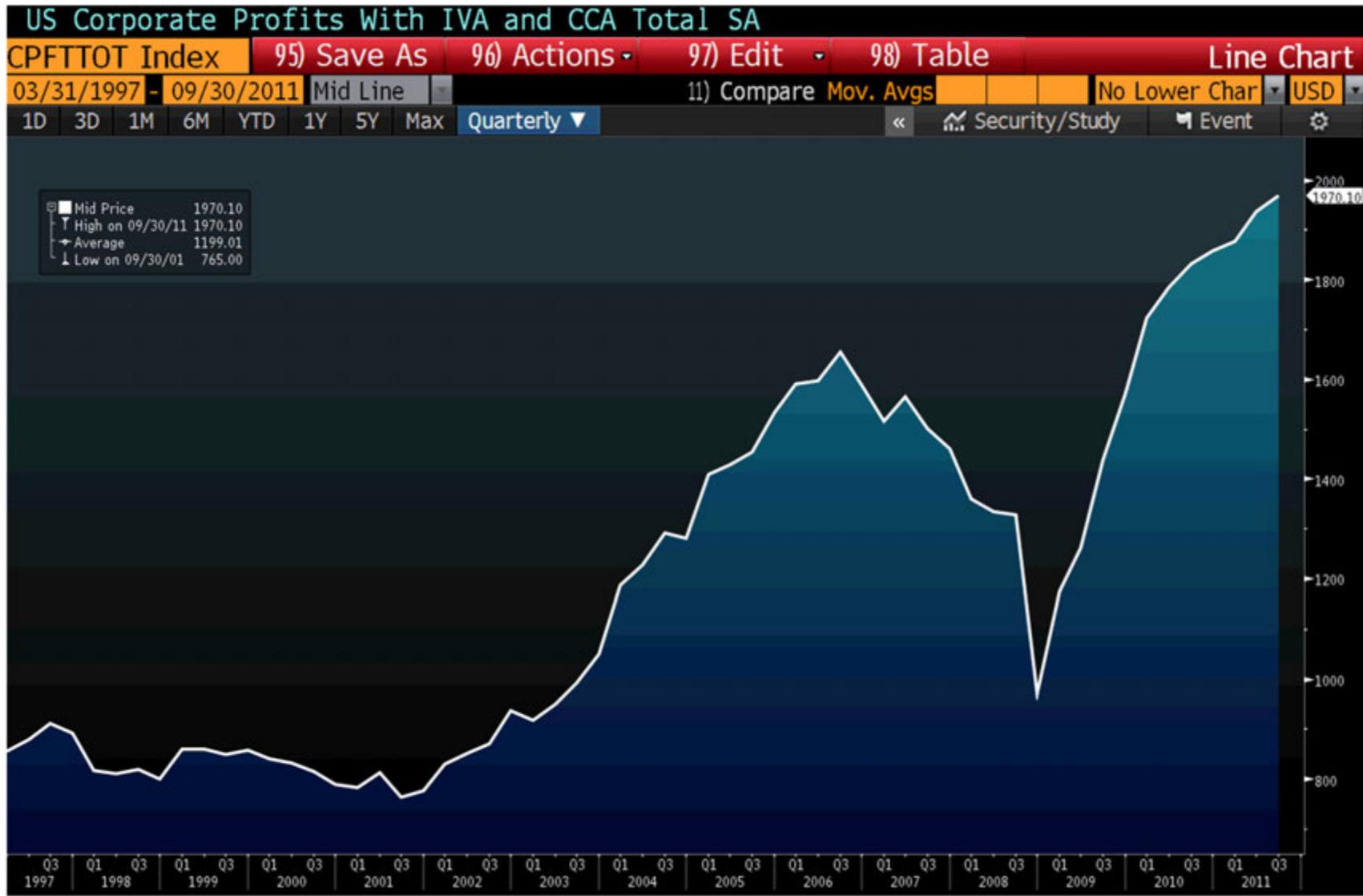
# Manage Market Value Risk by Following Credit Spreads



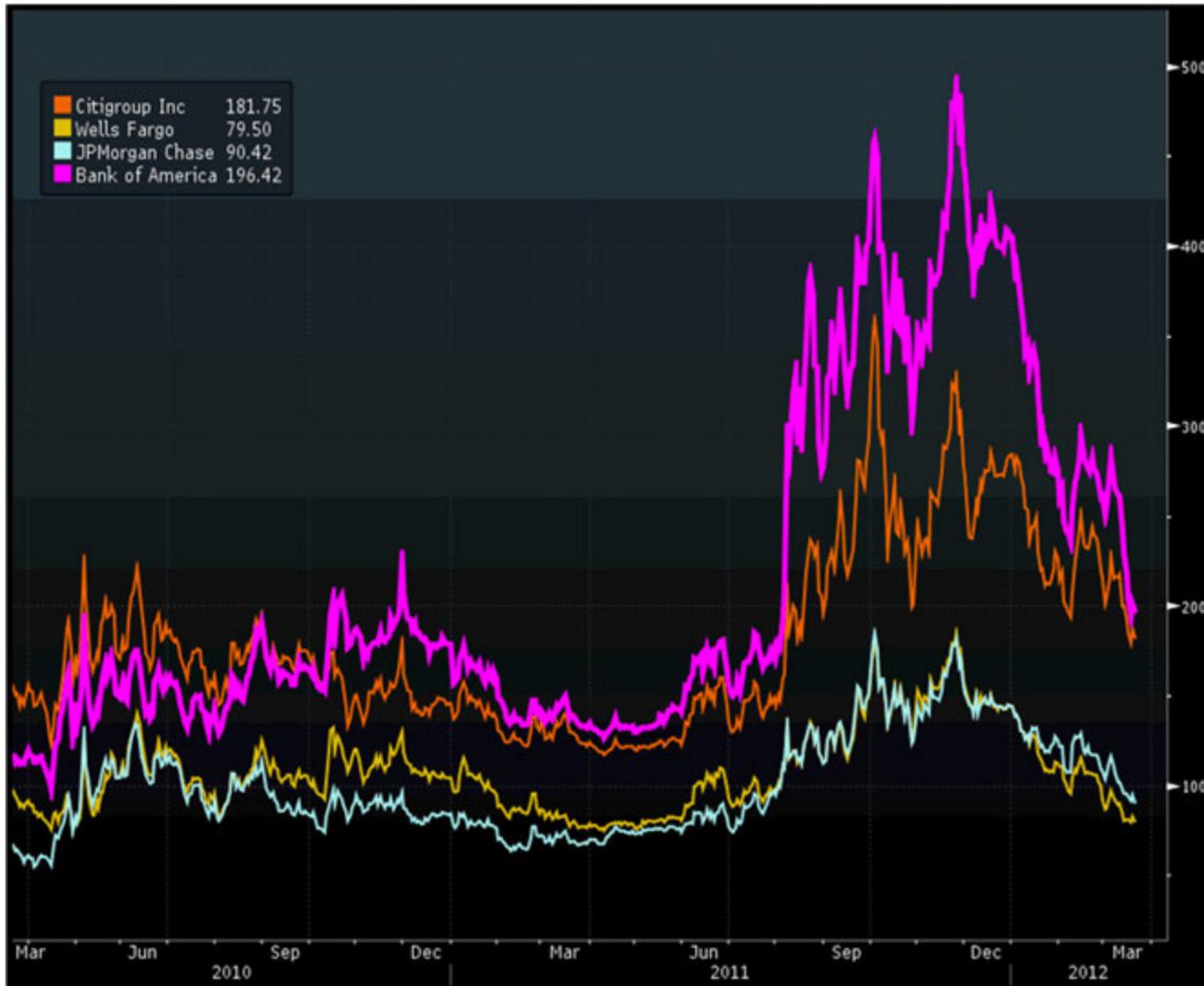
# Monitor Credit Rating Trends



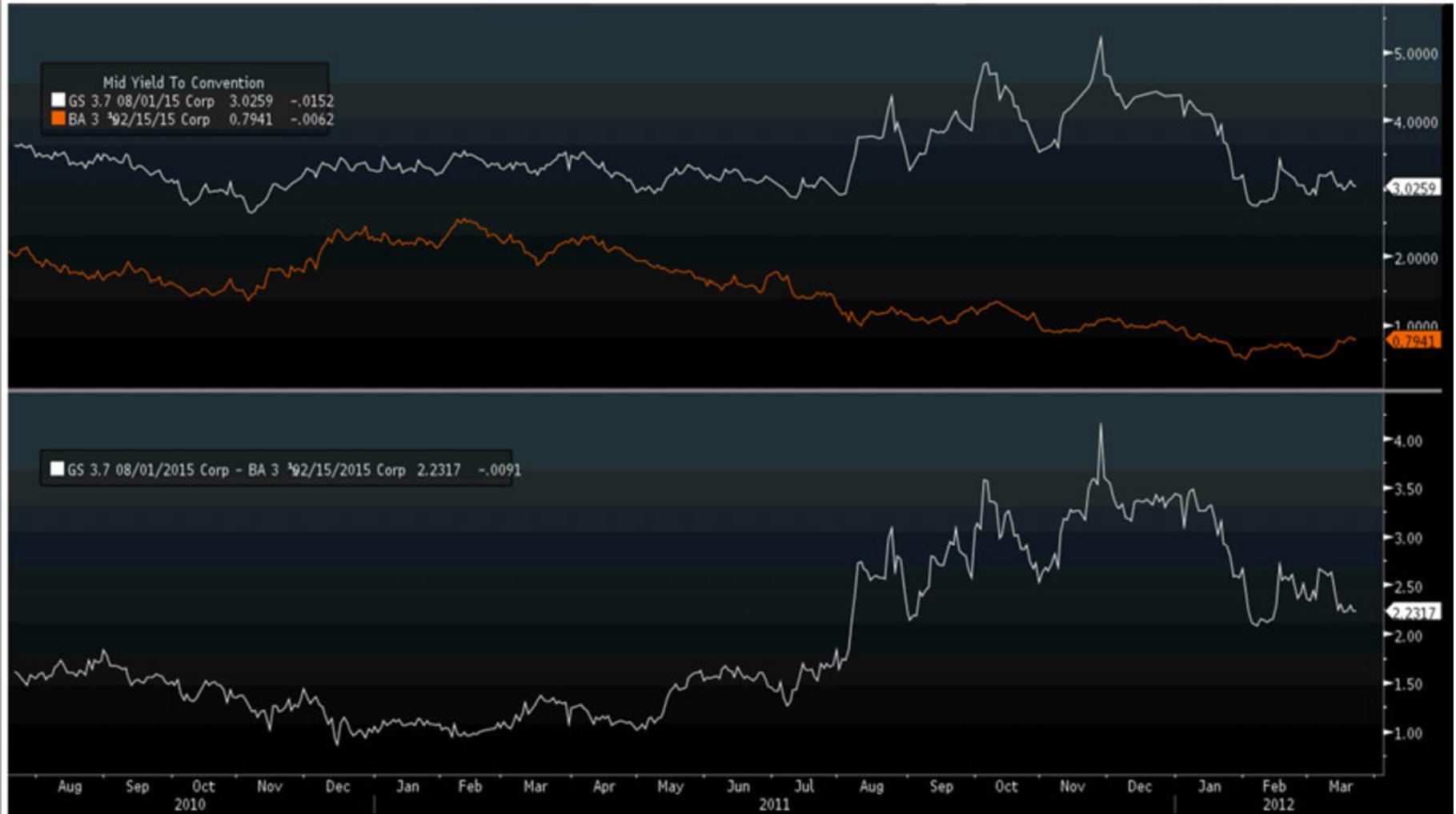
# Monitor Corporate Profits



# Monitor Credit Default Spreads



# Monitor Yield Relative to Other Issuers



# Monitor Earnings and News Announcements

| A   | Company                            | Date    | Time    | ET | Event Description                    |
|-----|------------------------------------|---------|---------|----|--------------------------------------|
| 1)  | 04/13/2012 (4 events)              |         |         |    |                                      |
| 2)  | JPMorgan Chase & Co                | C 04/13 | 04:00   | ER | Q1 12 A:- - E:1.126 S:- - G:- -      |
| 3)  | Wells Fargo & Co                   | C 04/13 | 05:00   | ER | Q1 12 A:- - E:0.723 S:- - G:- -      |
| 4)  | JPMorgan Chase & Co                | 04/13   | 05:30   | EC | Q1 12 Ph:(866) 541-2724 Pin:- -      |
| 5)  | Wells Fargo & Co                   | 04/13   | 07:00   | EC | Q1 12 Ph:866-872-5161 Pin:- -        |
| 6)  | 04/16/2012 (2 events)              |         |         |    |                                      |
| 7)  | Citigroup Inc                      | C 04/16 | 05:00   | ER | Q1 12 A:- - E:0.959 S:- - G:- -      |
| 8)  | Citigroup Inc                      | 04/16   | 08:00   | EC | Q1 12 Ph:(866) 516-9582 Pin:55701551 |
| 9)  | 04/17/2012 (4 events)              |         |         |    |                                      |
| 10) | US Bancorp                         | C 04/17 | Bef-mkt | ER | Q1 12 A:- - E:0.638 S:- - G:- -      |
| 11) | Goldman Sachs Group Inc/The        | C 04/17 | 05:00   | ER | Q1 12 A:- - E:3.204 S:- - G:- -      |
| 12) | US Bancorp                         | 04/17   | 05:00   | EC | Q1 12 Ph:866-316-1409 Pin:60125913   |
| 13) | Goldman Sachs Group Inc/The        | 04/17   | 06:30   | EC | Q1 12 Ph:888-281-7154 Pin:- -        |
| 14) | 04/18/2012 (3 events)              |         |         |    |                                      |
| 15) | PNC Financial Services Group Inc   | 04/18   | 05:00   | EC | Q1 12 Ph:877-272-3568 Pin:- -        |
| 16) | National Rural Utilities Cooperati | E 04/18 |         | ER | Q3 12 A:- - E:- - S:- - G:- -        |
| 17) | PNC Financial Services Group Inc   | C 04/18 |         | ER | Q1 12 A:- - E:1.456 S:- - G:- -      |
| 18) | 04/19/2012 (14 events)             |         |         |    |                                      |
| 19) | KeyCorp                            | C 04/19 | Bef-mkt | ER | Q1 12 A:- - E:0.187 S:- - G:-0.06    |

## Other Risk: Corporate Note Structures – 144A

| ISSUER INFORMATION                                        | IDENTIFIERS          |
|-----------------------------------------------------------|----------------------|
| Name MASSMUTUAL GLOBAL FUNDIN                             | Common 043775952     |
| Type Special Purpose Entity                               | ISIN US57629WBH25    |
| Market of Issue Priv Placement                            | CUSIP 57629WBH2      |
| SECURITY INFORMATION                                      | RATINGS              |
| Country US Currency USD                                   | Moody's Aa2          |
| Collateral Type Sr Secured                                | S&P AA+              |
| Calc Typ( 373)LONG ODD-LAST BNDS                          | Fitch AA+            |
| Maturity 7/16/2012 Series 144A                            | Composite AA         |
| NORMAL                                                    | ISSUE SIZE           |
| Coupon 3 <sup>5</sup> / <sub>8</sub> Fixed                | Aggr Amt Iss/Out *   |
| S/A 30/360                                                | USD 300,000.00 (M)/  |
| Announcement Dt 6/25/09                                   | USD 300,000.00 (M)   |
| Int. Accrual Dt 7/ 2/09                                   | Min Piece/Increment  |
| 1st Settle Date 7/ 2/09                                   | 100,000.00/ 2,000.00 |
| 1st Coupon Date 1/15/10                                   | Par Amount 2,000.00  |
| Iss Pr 99.92200                                           | BOOK RUNNER/EXCHANGE |
| SPR @ ISS 195.00 vs T 1 <sup>7</sup> / <sub>8</sub> 06/12 | BAS,CS               |
| NO PROSPECTUS DTC                                         | TRACE                |

ISS'D UNDER 144A. LONG 1ST & LAST CPN.

# Other Risk: Corporate Note Structures – Death Notes

| ISSUER INFORMATION                                            |                        | IDENTIFIERS            |                |                         |
|---------------------------------------------------------------|------------------------|------------------------|----------------|-------------------------|
| Name                                                          | GENERAL ELEC CAP CORP  | CUSIP                  | 36966RV94      | 1) Additional Sec Info  |
| Type                                                          | Diversified Finan Serv | ISIN                   | US36966RV943   | 2) ALLQ                 |
| Market of Issue                                               | Domestic MTN           | BB Number              | EH1983905      | 3) TRACE Trade Recap    |
| SECURITY INFORMATION                                          |                        | RATINGS                |                | 4) TRACE Trade History  |
| Country                                                       | US                     | Currency               | USD            | 5) Corporate Actions    |
| Collateral Type                                               | Sr Unsecured           | Moody's                | Aa2            | 6) Cds Spreads/RED Info |
| Calc Typ(                                                     | 1)STREET CONVENTION    | S&P                    | AA+            | 7) Ratings              |
| Maturity                                                      | 2/15/2012              | Composite              | AA             | 8) Custom Notes         |
| Series                                                        | NOTZ                   | ISSUE SIZE             |                | 9) Covenant/Default     |
| NORMAL                                                        |                        | Amt Issued/Outstanding |                | 10) Identifiers         |
| Coupon                                                        | 4                      | Fixed                  |                | 11) Fees/Restrictions   |
| S/A                                                           | 30/360                 | USD                    | 460,792.00 (M) | 12) Prospectus          |
| Announcement Dt                                               | 2/11/08                | USD                    | 460,792.00 (M) | 13) Sec. Specific News  |
| Int. Accrual Dt                                               | 2/14/08                | Min Piece/Increment    |                | 14) Involved Parties    |
| 1st Settle Date                                               | 2/14/08                | 1,000.00/              | 1,000.00       | 15) Issuer Information  |
| 1st Coupon Date                                               | 8/15/08                | Par Amount             | 1,000.00       | 16) Pricing Sources     |
| Iss Pr                                                        | 100.0000               | BOOK RUNNER/EXCHANGE   |                | 17) MTN Drawdown        |
| HAVE PROSPECTUS                                               | DTC                    | BAS                    |                | 18) Related Securities  |
|                                                               |                        | TRACE                  |                | 66) Send as Attachment  |
| <b>INTERNOTES. PUT IN EVENT OF HLDRS DEATH. LONG 1ST CPN.</b> |                        |                        |                |                         |

Source: Bloomberg

# Other Risk: Corporate Note Structures – Make-Whole Callable

| PFIZER INC                                     |  |                   | PFE4.45 03/15/12 |                             | 105.250/105.250 |  | (0.68/0.68) TRAC |                         |
|------------------------------------------------|--|-------------------|------------------|-----------------------------|-----------------|--|------------------|-------------------------|
| <b>ISSUER INFORMATION</b>                      |  |                   |                  | <b>IDENTIFIERS</b>          |                 |  |                  | 1) Additional Sec Info  |
| Name PFIZER INC                                |  |                   |                  | Common 041931647            |                 |  |                  | 2) ALLQ                 |
| Type Medical-Drugs                             |  |                   |                  | ISIN US717081CZ40           |                 |  |                  | 3) TRACE Trade Recap    |
| Market of Issue Global                         |  |                   |                  | CUSIP 717081CZ4             |                 |  |                  | 4) TRACE Trade History  |
| <b>SECURITY INFORMATION</b>                    |  |                   |                  | <b>RATINGS</b>              |                 |  |                  | 5) Corporate Actions    |
| Country US                                     |  | Currency USD      |                  | Moody's A1                  |                 |  |                  | 6) Cds Spreads/RED Info |
| Collateral Type Sr                             |  | Unsecured         |                  | S&P AA                      |                 |  |                  | 7) Ratings              |
| Calc Typ( 1)                                   |  | STREET CONVENTION |                  | Fitch AA-                   |                 |  |                  | 8) Custom Notes         |
| Maturity 3/15/2012                             |  | Series            |                  | Composite AA-               |                 |  |                  | 9) Covenant/Default     |
| MAKE WHOLE                                     |  |                   |                  | <b>ISSUE SIZE</b>           |                 |  |                  | 10) Identifiers         |
| Coupon 4.45                                    |  | Fixed             |                  | Amt Issued/Outstanding      |                 |  |                  | 11) Fees/Restrictions   |
| S/A 30/360                                     |  |                   |                  | USD 3,500,000.00 (M)/       |                 |  |                  | 12) Prospectus          |
| Announcement Dt 3/17/09                        |  |                   |                  | USD 3,500,000.00 (M)        |                 |  |                  | 13) Sec. Specific News  |
| Int. Accrual Dt 3/24/09                        |  |                   |                  | Min Piece/Increment         |                 |  |                  | 14) Involved Parties    |
| 1st Settle Date 3/24/09                        |  |                   |                  | 2,000.00/ 1,000.00          |                 |  |                  | 15) Issuer Information  |
| 1st Coupon Date 9/15/09                        |  |                   |                  | Par Amount 1,000.00         |                 |  |                  | 16) Pricing Sources     |
| Iss Pr 99.86300                                |  |                   |                  | <b>BOOK RUNNER/EXCHANGE</b> |                 |  |                  | 17) Related Securities  |
| SPR @ ISS 305.00 vs T 1 $\frac{3}{8}$ 03/12    |  |                   |                  | JOINT LEADS                 |                 |  |                  | 18) Issuer Web Page     |
| HAVE PROSPECTUS DTC                            |  |                   |                  | Multiple                    |                 |  |                  | 66) Send as Attachment  |
| <b>SHORT 1ST CPN. CALL @ MAKE-WHOLE +50BP.</b> |  |                   |                  |                             |                 |  |                  |                         |

Source: Bloomberg

# Credit Risk Can Be Managed

- Staff with experience evaluating credit quality
- Credit evaluation resources
- Issuer percentage limits
- Formal approval process
- Approved issuer list
- Procedures for ongoing credit monitoring
- Be proactive when warning signs arise



## Conclusion

- Establish **written** guidelines and stick to them
- Risks can be managed
- Monitor duration to manage interest rate risk
- Limit callables to manage call risk
- Manage credit risk by monitoring spread relationships and other markets
- Measure performance

**QUESTIONS?**

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